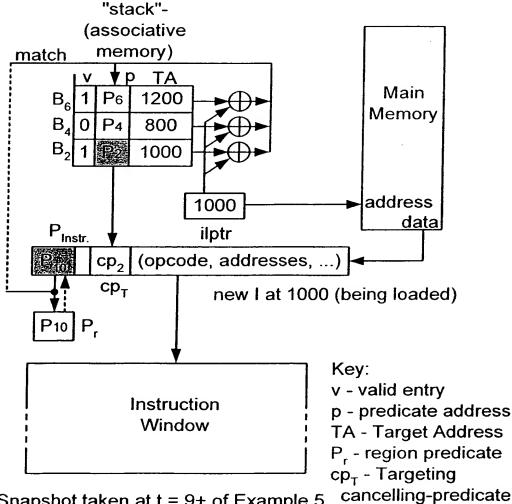


Telephone: 650-326-2400 Inventors: Augustus K. Uht et al.
Title: Automatic and Transparent Hardware Conversion of Traditional Control Flow to Predicates
Replacement drawing, Sheets of drawings 1 of 5

George B. F. Yee, Reg. No. 37,478

B₁ B₁ B₂ B₂ B₂ B₂ DISJOINT NESTED OVERLAPPED FIG. 1



Snapshot taken at t = 9+ of Example 5. cancelling-predicate -new I matches target address in stack

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Replacement drawing, Sheets of drawings 2 of 5

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predicate-use (at code execution time)		Pout Cpout P ₁ - condition for I execution	p ₁ =1 - 1	$p_2 = \overline{bc_2}$ bc_2 1	. bc ₂	$cp_2 \overline{bc_2} + bc_2 - \overline{bc_2} + bc_2 = 1$	- p ₄ =1	bc ₆ .p ₄ bc ₆ .p ₄ 1	og -	cp ₆ bc ₆ +bc ₆ - bc ₆ +bc ₆ =1	- p ₆ =1	Equations - for "T": p ₁ =p _{out} =p _{in} +cp _{in} ; for "B": p _{out} =bc·p _{in} ; cp _{out} =bc·p _{in}
t T		S E	0	0	0	60	0	0	0	ဝိ	0	= pout
ignmei me)		pin=pr cpin	~	~	σ2	σ°	$\overline{\mathbb{C}}_4$	$\sigma_{_{4}}$	٣	ᡆᢅ	۵∞	T": p.:
predicate-assignment (at load time)	stack	B 'p TA	empty	B ₂ 1 P ₂ 400	B ₂ 1 P ₂ 400	empty	empty	B _e 1 P _e 800	B _e 1 P _e 800	empty	empty	Equations - for '
			x = x ob y	r (bc ₂) goto 400				j if (bc ₆) goto 800		-		
		code		B 2	_ _E	_ ₄	_s	മ്	1	_∞	_6	
		time address code	100	200	300	400	200	009	200	800	006	
	load	time	_	7	ო	4	ഹ	ω	^	∞	တ	

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Replacement drawing, Sheets of drawings 3 of 5

predicate-assignment predicate-use (at load time)	stack	B v p TA pin=p, cpin pout cpout p, - condition for l execution	empty 1 0 p ₁ =1 - 1	$B_2 1 P_2 800 1 0 P_2 = \overline{bc_2} bc_2 1$	$B_2 1 P_2 800 P_2 0 - \frac{bc_2}{}$	0 B_4 1 P_4 600 P_2 0 bc_4 + p_2 bc_4 : p_2 1 B_2 1 P_2 800	B_4 1 P_4 600 P_4 0 - Dc_2 Dc_2	$B_2 1 P_2 800$ $P_4 cp_4 p_6 cp_4 - bc_4 bc_2 + bc_4 bc_2 = bc_2$	$B_2 1 P_2 800 P_6 0 - \frac{bc_2}{}$	empty P ₆ cp ₂ p ₆ +cp ₂ - bc ₂ +bc ₂ =1	empty P ₈ 0 1	Equations - for "T": p ₁ =p _{out} =p _{in} +cp _{in} ; for "B": p _{out} =bc·p _{in} ; cp _{out} =bc·p _{in} FIG. 4
			z = x op y	if (bc_2) goto 800		if (bc ₄) goto 600				,		
		code		B ₂	_e	В ₄	_s	V 9	-1		_6	
		address	100	200	300	400	200	009	200	800	006	
	load	time	~	7	က	4	ഹ	ဖ	_	ω	တ	

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Replacement drawing, Sheets of drawings 4 of 5

predicate-assignment predicate-use (at load time)	Stack B v n TA D; = D CD D - condition for Levertition	empty 1 0 p ₁ =1	if (bc ₂) goto 600 B ₂ $1 P_2 600$ 1 0 $P_2 = \overline{bc_2}$ bc ₂	$B_2 1 P_2 600 P_2 0 - \frac{bc_2}{}$	if (bc ₄) goto 800 B ₄ $\frac{1 P_4}{1 P_2} \frac{800}{600}$ P ₂ 0 $\frac{1}{1 P_2} \frac{1}{1 P_2} $	B_4 $1 P_4$ 800 P_4 0 $\frac{bc_4 \cdot bc_2}{}$	B_{2} 1 P_{4} 800 P_{4} Cp_{2} p_{4} Cp_{2} - $(bc_{4} \cdot bc_{2}) + bc_{2} = bc_{4} + bc_{2}$	B_{2} 1 P_{4} 800 P_{6} 0 $\frac{bc_{4}+bc_{2}}{bc_{4}}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	empty P ₈ 0 -	Equations - for "T": p ₁ =p _{out} =p _{in} +cp _{in} ; for "B": p _{out} =bc·p _{in} ; cp _{out} =bc·p _{in}
	code		B_2	_m	В 4	_c	ψ ω	4		_6	
	address code	100	200	300	400	200	009	700	800	006	
	load time a	~	7	ო	4	ഗ	ဖ	7	∞	တ	

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Replacement drawing, Sheets of drawings 5 of 5

				predicate-assignment (at load time)			predicate-use (at code execution time)				
								DOGC CAC			
loa <u>tim</u>	d e <u>address</u>	code		stack B v p TA p _{in}	<u>-p,</u>	cp _{ir}	p _{out}	cp _{out}	p _I - condition for I execution		
1	100	1,	z = x op y	empty	1	0	p ₁ =1	-	1		
2	200	B ₂ —	if (bc ₄) goto 800	B ₂ 1 P ₂ 1000	1	0	$p_2 = \overline{bc}_2$	bc ₂	1		
3	300	l ₃		B ₂ 1 P ₂ 1000 F	2	0	-	-	bc ₂		
4	400	B ₄ —	if (bc ₄) goto 800	B ₄ 1 P ₄ 800 F B ₂ 1 P ₂ 1000	2	0	bc ₄ +p ₂	bc ₄ ·p ₂	1		
5	500	l ₅		B ₄ 1 P ₄ 800 P	4	0	-	-	bc ₄ ·bc ₂		
6	600	B_6	if (bc ₆) goto 1200	B ₆ 1 P ₆ 1200 P B ₄ 1 P ₄ 800 B ₂ 1 P ₂ 1000	4	0	bc ₆ ⋅p ₄	bc ₆ ·p ₄	1		
7	700	I ₇		B ₆ 1 P ₆ 1200 P B ₄ 1 P ₄ 800 B ₂ 1 P ₂ 1000	6	0	-	-	$\overline{bc}_6 \cdot \overline{bc}_4 \cdot \overline{bc}_2$		
8	800	I ₈ ◀		B ₆ 1 P ₆ 1200 B ₄ 0 P ₄ 800 B ₂ 1 P ₂ 1000	₆ C	p ₄	p ₆ +cp ₄	- (b	$\overline{c_6 \cdot \overline{bc_4} \cdot \overline{bc_2}}) + (\underline{bc_4} \cdot \overline{bc_2})$ $= (\underline{bc_6} + \underline{bc_4}) \overline{bc_2}$		
9	900	l ₉		B ₆ 1 P ₆ 1200 B ₄ 0 P ₄ 800 B ₂ 1 P ₂ 1000	3	0	-	-	$(\overline{bc}_6 + bc_4)\overline{bc}_2$		
10	1000	10		B ₆ 1 P ₆ 1200 P ₈	, C	p ₂	p ₈ +cp ₂	- ($(\overline{bc}_{6} + bc_{4})\overline{bc}_{2}) + bc_{2}$		
11	1100	I ₁₁		B ₆ 1P ₆ 1200 P ₁	0	0	-	-	$\frac{\overline{bc}_{6}}{\overline{bc}_{6}} + \overline{bc}_{4} + \overline{bc}_{2}$ $(\overline{bc}_{6} + \overline{bc}_{4}) \overline{bc}_{2}$		
12	1200	I ₁₂		empty P ₁	0 C	թ ₆ դ	o ₁₀ +cp ₆		bc ₆ +bc ₄ +bc ₂ +		
13	1300	1 ₁₃		empty P ₁	2 ()	-	-	$(bc_6 \cdot bc_4 \cdot bc_2) = 1$		
	•			Equations - for "T": p ₁ :	-p _{or}	t=biu	+cp _{in} ; for	"B": p _{out} =	=bcp _{in} ; cp _{out} =bc-p _{in}		

FIG. 6